Available online at http://scik.org
J. Math. Comput. Sci. 11 (2021), No. 4, 4332-4350
https://doi.org/10.28919/jmcs/5770
ISSN: 1927-5307

PARAMETERS INFLUENCING THE ATTITUDE OF STUDENTS TOWARDS LEARNING MATHEMATICS AND OF TEACHERS TOWARDS TEACHING MATHEMATICS

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Abstract. The main objective of this paper is to recognize how certain distinct but interrelated factors could lead to an interpretation of students' performance in mathematics. Since, students may like, appreciate, or may dislike mathematics on the contrary. A long-term favorable or unfavourable willingness to mathematics may be defined. It is necessary to create and maintain a positive approach towards studying math. There is a connection between a student's attitude to mathematics and their mathematics faculty. There are several other variables that may impact this attitude towards learning mathematics. A questionnaire has been designed for this research which includes numerous questions, to recognize variables impacting rural areas in Assam. 13 colleges in the rural region of Assam are surveyed in the questionnaire. The survey includes approximately 3,000 students. The results revealed that the most important aspect is the teacher: the behavior of the teacher and the way of his/her mathematics

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Received March 26, 2021

teaching and the extent of faith he/she provides to the student with impact definitely influence their perception towards mathematical problems.

Keywords: attitude; interest; effective domain; learning and teaching mathematics.

2010 AMS Subject Classification: 00A35, 97B50, 97C70.

1. INTRODUCTION

Behaviour may be considered as a cognitive and effective attitude towards mathematics [1]. This behaviour is indeed quite predictable and involves both attitudinal and behavioural factors [2]. A bi dimensional theory of reasoned action includes only beliefs and ideas related to mathematics. B. B. Ashby explained influentially that how students attitude fluctuates towards mathematics [3]. The approach has three main components: instinctive attachment, mathematics believes, and specific topic behavioural patterns [4]. Belief in mathematics and its usefulness in practice and mathematical anxiety are some of the variables impacting mathematics anxiety [3]. The attitude of the students to mathematics is correlated to their quantitative observations [1]. Most of the relevant analysis has already been made by numerous authors [5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15]. The purpose of this research is to recognize the findings of the research on factors that can influence the mathematical perspectives of students. Basically, the primary objective of the analysis is to find determinants that affect the perceptions of students towards mathematics at the graduation level, including:

1.1. Hypothesis.

The research hypotheses are as follows:

(1) Students' perception towards mathematical faculty.
(2) Students's struggle toward mathematics.
(3) Students' self-effectiveness towards mathematical problems.
(4) Students' behavior towards assistance attitude for mathematical issues.
(5) Students' behavior towards mathematics problem solving.
(6) Students'choice towards higher level mathematics
(7) Students' behavioral change towards mathematics class.
(8) Students' visualization towards mathematics application.
(9) Students' attitude towards mathematics under specified barricades.

1.2. Method for Analysis. The methodology for research investigation is a questionnaire containing approximately 60 items. The 60% analysis is focused on the pupil's attitude towards the subject and the rest is based on the pupil's willingness to change the teaching attitude. If the whole data is analyzed properly then it can easily be seen that there are many loopholes from teacher's side. Teaching is a profession in which expression is more important than knowledge. Our analysis is measured on a 5 point Likert scale of 1—strongly disagree to 5—strongly agree. These aspects were designed on the basis of existing literature to certain self-regulatory learning traits such as self-effectiveness, fact of judging oneself and self-reaction. Cronbach's alpha reliability (Cronbach's alpha is used to measure of logical consistency, that is, how strongly related a set of objects are as a group. It is estimated as a function of the reliability and validity. Cronbach's alpha tests to see whether multiple-question Likert scale questionnaires are efficient.)

1.3. Sample analysis including various barricades. The sample is a set of approximately 3000 arbitrarily selected from 13 colleges(especially those students are selected who study mathematics in all semesters) from rural areas of Assam. Under the community barricade it is easily observed that approximately 7% students think that boys are better when it comes to mathematics. It is quite amazing as well when we got to know that approximately 30% students are those for whom mathematics wasn't their choice at all, their decision of opting mathematics was just because of family pressure, peer pressure and 'No other choice'. The most common age groups for students are 17 to 22 years. In Figure 1 the pupils' gender behavioural perception can easily be seen towards mathematics. The fluctuations between the responses are easy to understand.

Whereas in Figure 2 it can easily understandable that under the Academic Barricades students aren't satisfied with the teacher's way of teaching. There is lack of application part from the teacher's side. For teachers, instead of teaching a topic in a visualized way, teachers mostly focus on syllabus completion, assignment and tests. According to the students teachers are still teaching in the old way whereas there are lots of method to teach in a better manner. According to the Students mathematics was more satisfactory at school level but even at school level, it was difficult for them to relate mathematics to general life which means application part was missing even at college level.

	Yes Average (%)	No Average (%)	Neutral Average (%)
Protocol Barricades (in %)	48.03333333	42.26666667	9.7
Community Barricades(in %)	47.87	46.594	5.536
Academic Barricades(in %)	40.94333333	44.025	15.03166667

Table 1: Comparison between “yes”, ”no” and Neutral average%

Protocol Barricades and Community Barricades	0.993570383
Protocol Barricades and Community Barricades	0.992395012
Academic Barricades and Protocol Barricades	0.972078063

Table 2: Correlation Coefficient between the barricades

	Yes (%)	No (%)	Neutral (%)
Is the boys are good in mathematics	88.6	8.2	3.2
Is the Girls are good in mathematics	20.9	78.5	0.6
Is the decision for Opting Mathematics taken by the choice of student	30.45	64.8	4.75
Difficult Subject to understand in comparison to others	89.6	2.8	7.6
Is Opting mathematics planned according to employment	9.8	78.67	11.53

Table 3: Response under the Community Barricades (in %)

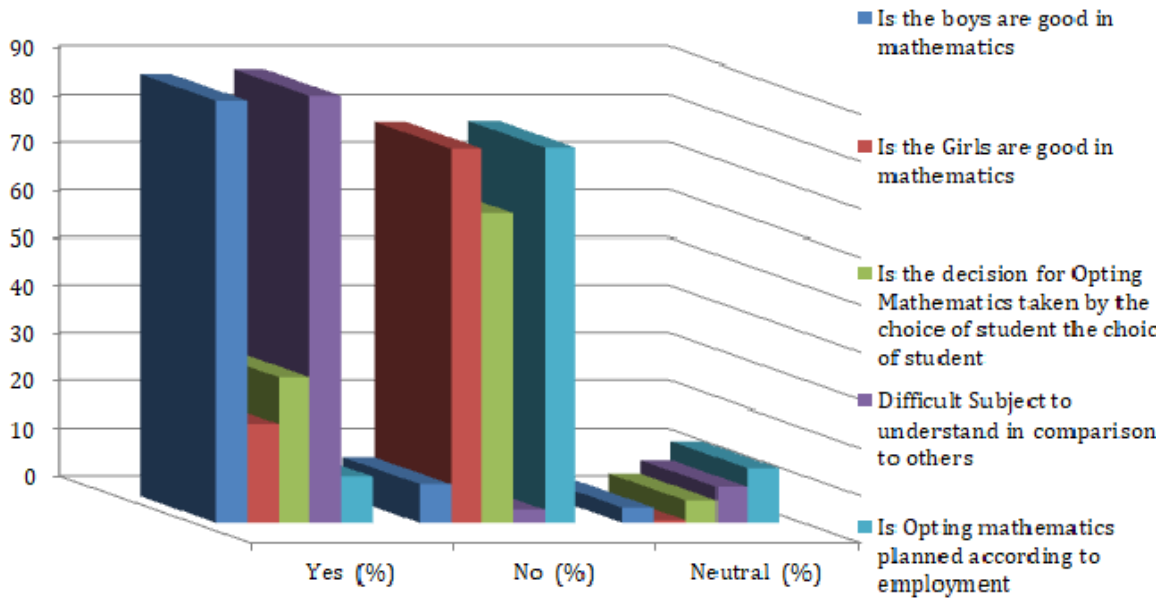

FIGURE 1. Response under the Community Barricades

	Yes (%)	No (%)	Neutral (%)
Teacher only teaches the topic without any application example	56.78	23.2	20.02
Assignments given by teachers	78.6	6.8	14.6
Is Practical Lab exists for maths	1.8	96.7	1.5
Is teacher uses additional learning technology for mathematics	23.67	45.98	30.35
Do you know the logical reasoning behind the driven question	46.89	24.67	28.44
Are the short Tricks given by teachers to solve questions fast	13.5	77.7	8.8
Idea about Vedic Mathematics	81.2	12.3	6.5

Table 4: Questionnaire response under the Academic Barricades (in %)

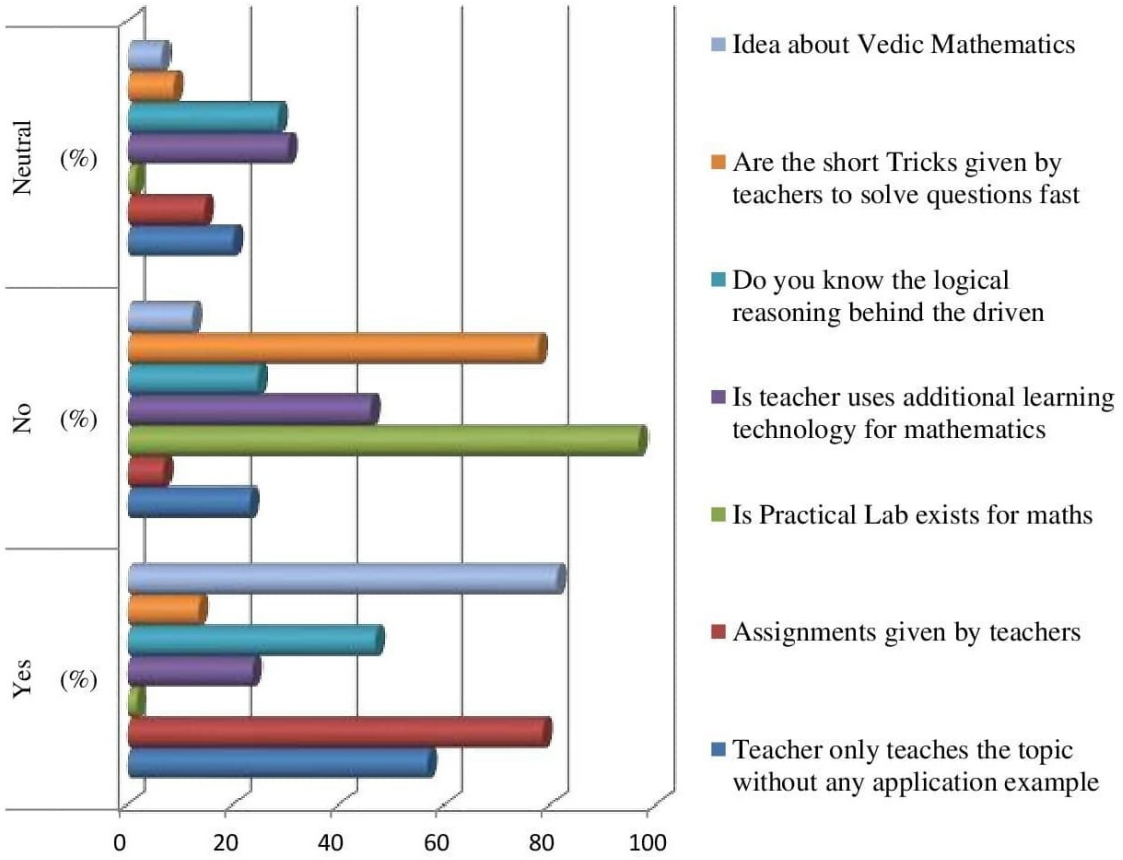

FIGURE 2. Response under the Academic Barricades

	Yes (%)	No (%)	Neutral (%)
Mathematics at school level were satisfactory	74.3	18.7	7
Contents of maths books are relevant to daily life	8.4	68.9	22.7
Contents of school maths books are linked with college level contents	82.2	10.2	7.6
The continuity of contents in all years of college level	88.5	9.9	1.6
The continuity of contents in all years of college level	43.23	26.74	29.06
Satisfied from the education policy	22.7	67.7	9.6
Have any Subject related to applications of Math's learning	12.1	78.2	9.7

Table 5: Response under the Protocol barricades (in %)

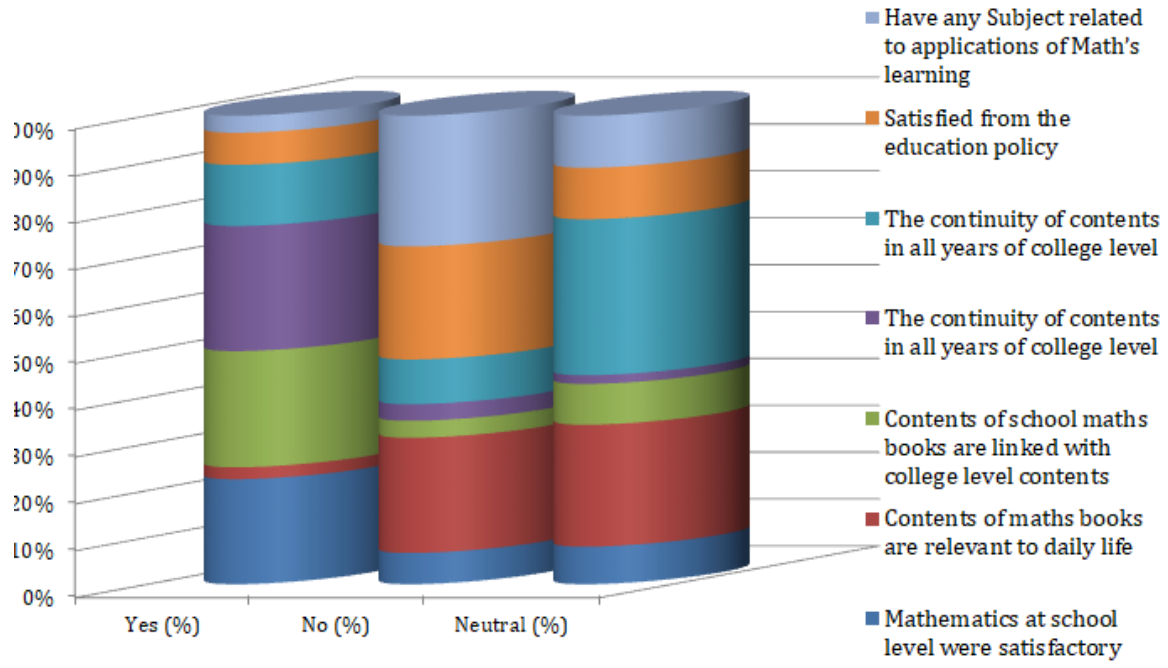

FIGURE 3. Responses under the protocol specified barricades

	Average (%)	Not typical (%)	depends on topic (%)	Depends on faculty (%)	Typical (%)
Mathematics seems to have little relationship to reality.	4.78	50.21	11.05	16.68	18.72
There seems to be a connection between mathematics and daily life.	5.62	27.34	8.05	14.68	46.64
I'll trying to use mathematics in everyday life.	6.42	18.91	6.74	11.68	54.88

Table 6: Questionnaire based on significant aspect to the self-assurance on the general life application of mathematics

	Average (%)	Not typical (%)	Typical (%)
Dyscalculia – Struggle with formulas	3.12	8.24	86.18
Math anxity – Deliberate feeling of failure	3.56	18.57	63.54
Weak Foundation	6.12	16.26	74.62
Abstract behavior of mathematics	3.24	17.85	76.42
No room for error.	3.91	12.64	68.45
Mathematics builds on itself (i.e. everything is interrelated)	4.08	14.21	72.56
Wrong Perception (Students expect mathematics to be difficult)	5.89	16.43	63.46
Memorization of concepts without understanding	3.98	15.69	74.52
Mathematics requires extreme practice	2.73	13.54	71.92

Table 7: Questionnaire to understand the struggle of students at college level

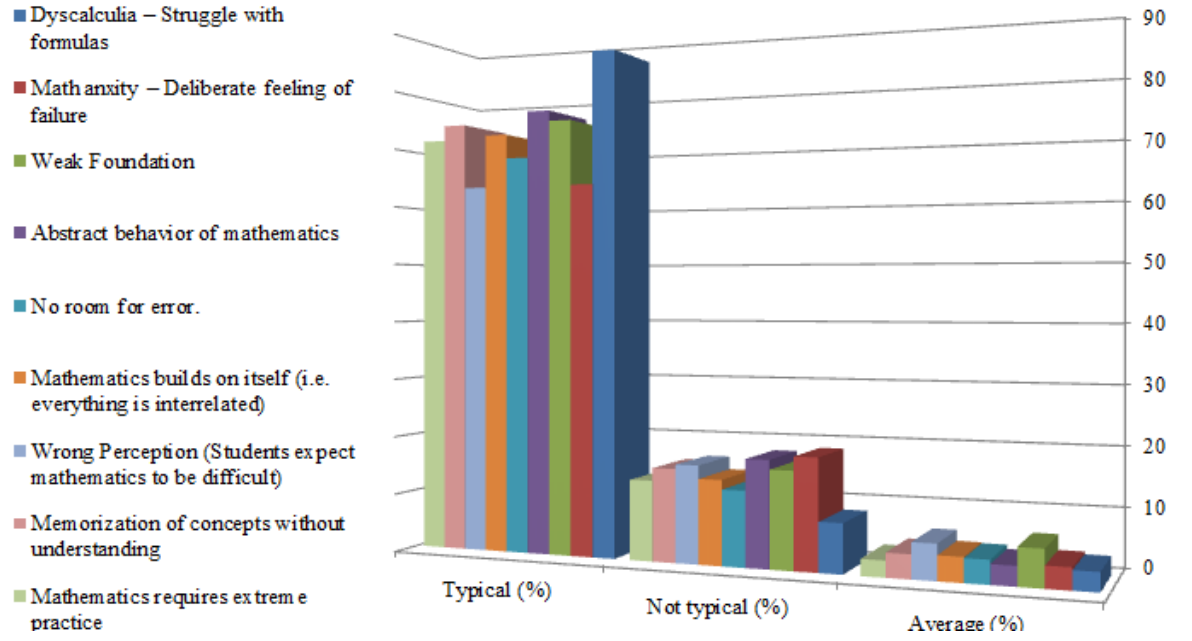

FIGURE 4. Graphical representation of Questionnaire based response

Learners are very well conscious that there is a significant amount of interconnectedness between mathematics at school's level and college's level.

Various learners really aren't pleased with the education policy (Figure 3 and Figure 4). Correlation between the various barricades is easy to understand (Fig 5). Protocol barricades and community barricades are highly related whereas academic barricades and Protocol barricades are least related. To understand the students' attitude towards learning mathematics, the questionnaire is categorized on the basis of few factors related with

(1) the perception towards mathematics
(2) self-effectiveness,
(3) assistance,
(4) self-judgment,
(5) self-reaction,
(6) mathematics anxiety,
(7) the utility of mathematics, and teacher.

Every factor is evaluated on a 5-point Likert scale (Likert scale is a 5-point scale that is being used to allow individuals to convey how much they agree or disagree with a particular statement) from 1—strongly not agree to 5—strongly agree. Certain factors describe the behavioral characteristic of the relevant category; a few of them characterize inappropriate behaviour. In the case of an entirely unexpected activity, we have reversed the numbers when measuring the averages (replacing 1 with 5 and vice versa, 2 with 4 and vice versa).

In order to acquire the percentages for those who think that the behaviour in question is not appropriate for them, we have incorporated the percentages of those who have preferred variant 1 or 2. In the similar way, in order to acquire the percentages for those who claim that the action is ordinary for them, we have incorporated the statistics for those who have preferred variant 4 or 5.

	Average (%)	Not typical (%)	Typical (%)
My mathematics faculty describes mathematics with excitement.	14.12	19.04	66.18
My mathematics faculty is one of my favourite teachers	13.24	41.46	53.18
My faculty encourages me if I have a hard time with mathematics	17.03	24.76	68.12
My faculty has strong understanding, but he/she lacks the ability to describe the few mathematical topic.	14.24	19.32	68.12
Better representation of the subject is required	3.71	12.64	78.33
Visualization of the subject is more essential	2.98	13.27	75.68
Subject is not that difficult, but requires a clearer examples	2.71	16.64	76.33
Faculty should start from scratch with the day to day based application.	4.98	17.56	68.97
Subject is not that difficult, but requires a clearer examples	4.98	17.56	68.97
Pure mathematics could be much more relevant with the proper involvement of the faculty.	3.28	13.36	78.64

Table 8: Questionnaire relevant to the mathematics teacher of the survey's participants.

	Average (%)	Not typical(%)	Typical (%)
Feeling optimistic	23.46	49.28	26.71
Stressed	49.50	21.61	23.24
Anxiety of math	43.23	26.74	29.06

Table 9: Questions associated with feelings for the class of mathematics

	Average (%)	Not typical (%)	Typical (%)
Dyscalculia – Struggle with formulas	3.56	8.24	86.18
Math anxity – Deliberate feeling of failure	3.56	18.57	63.54
Weak Foundation	6.12	16.56	74.62
Abstract behavior of mathematics	3.24	17.85	76.42
No room for error	3.91	12.64	68.45
Mathematics builds on itself (i.e. everything is interrelated)	4.08	14.21	72.56
Wrong Perception (Students expect mathematics to be difficult)	5.89	16.43	63.46
Memorization of concepts without understanding	3.98	15.69	74.52
Mathematics requires extreme practice	2.73	13.54	71.92

Table 10: Questionnaire to understand the struggle of students at college level

	Average (%)	Not typical (%)	Typical (%)
I'm scared of mathematics	6.27	38.83	86.18
I probably isn't able to be a nice mathematician	11.83	58.42	36.28
I am comfortable at mathematics	7.38	46.15	34.52

Table 11: Questionnaire based on self-efficiency

	Average (%)	Not typical (%)	Typical (%)
When I don't understand something in mathematics classes, I request my lecturer right away to clear my doubt.	9.31	39.47	51.85
When I find it difficult to understand anything in mathematics classes, I ask my friends to help me out.	13.70	51.32	36.45
I only seek for assistance if I can't solve my homework.	6.72	32.52	54.26

Table 12: Questionnaire relevant to the quest for help

	Average (%)	Not typical (%)	Typical (%)
I'm scared of mathematics	6.27	38.83	86.18
I probably isn't able to be a nice mathematician	11.83	58.42	36.28
I am comfortable at mathematics	7.38	46.15	34.52

Table 13: Questionnaire based on self-efficiency

	Average (%)	Not typical (%)	Typical (%)
I would have better results if I practised more.	16.23	33.27	44.56
I might be better in mathematics if I were more patient in overcoming problems.	11.67	31.35	4.74
Regardless of how long I spend math, I can't make better points.	7.78	63.17	22.34

Table 14: Questionnaire related to Personal assessment

	Average (%)	Not typical (%)	Typical (%)
If I come up with a solution right, I'm very proud and excited about it.	14.27	28.72	54.82
I feel pretty good if I get excellent grade in mathematics.	15.64	32.75	53.43

Table 15: Questionnaire related to Self-satisfaction

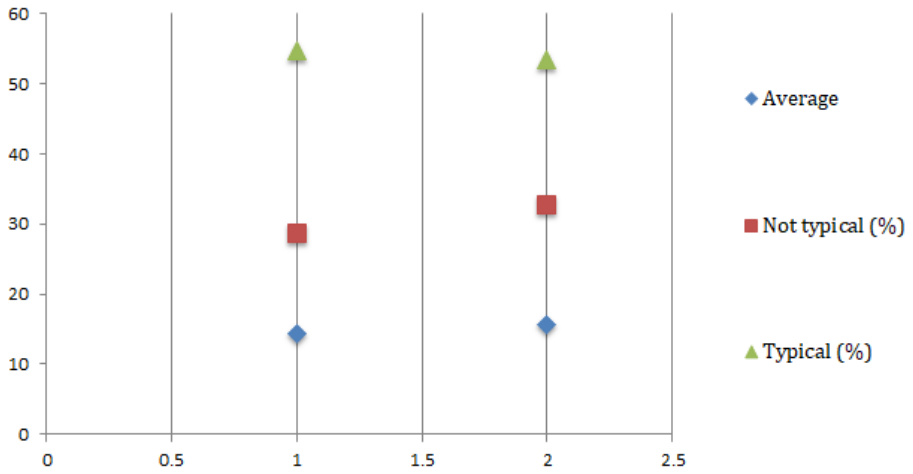

FIGURE 5. Graphical representation of Questionnaire based response

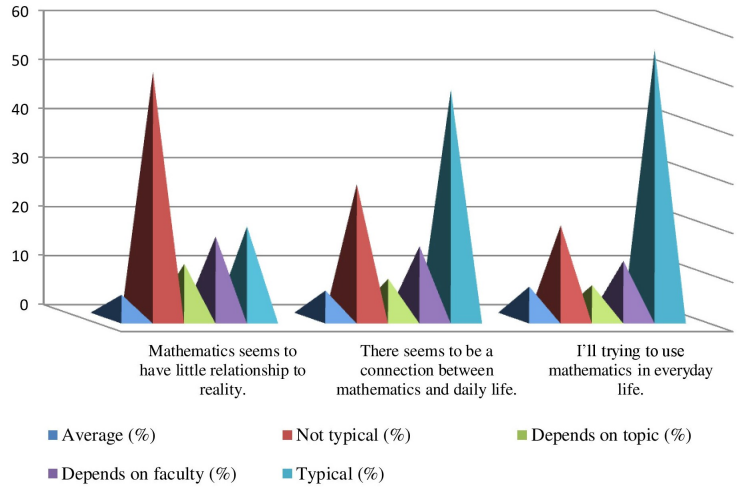

FIGURE 6. Graphical representation of Questionnaire based response

	Pure Mathematics (%)	Applied Mathematics (%)	Mathematical topic is seen in day to day life (%)
Which form of mathematics you love the most	16.32	43.95	34.72
Your mathematics faculty is good at explaining	28.64	48.95	18.05
Mode of teaching is more interesting for which form of mathematics	12.32	52.18	34.72

Table 16: Questionnaire related to Higher Mathematics

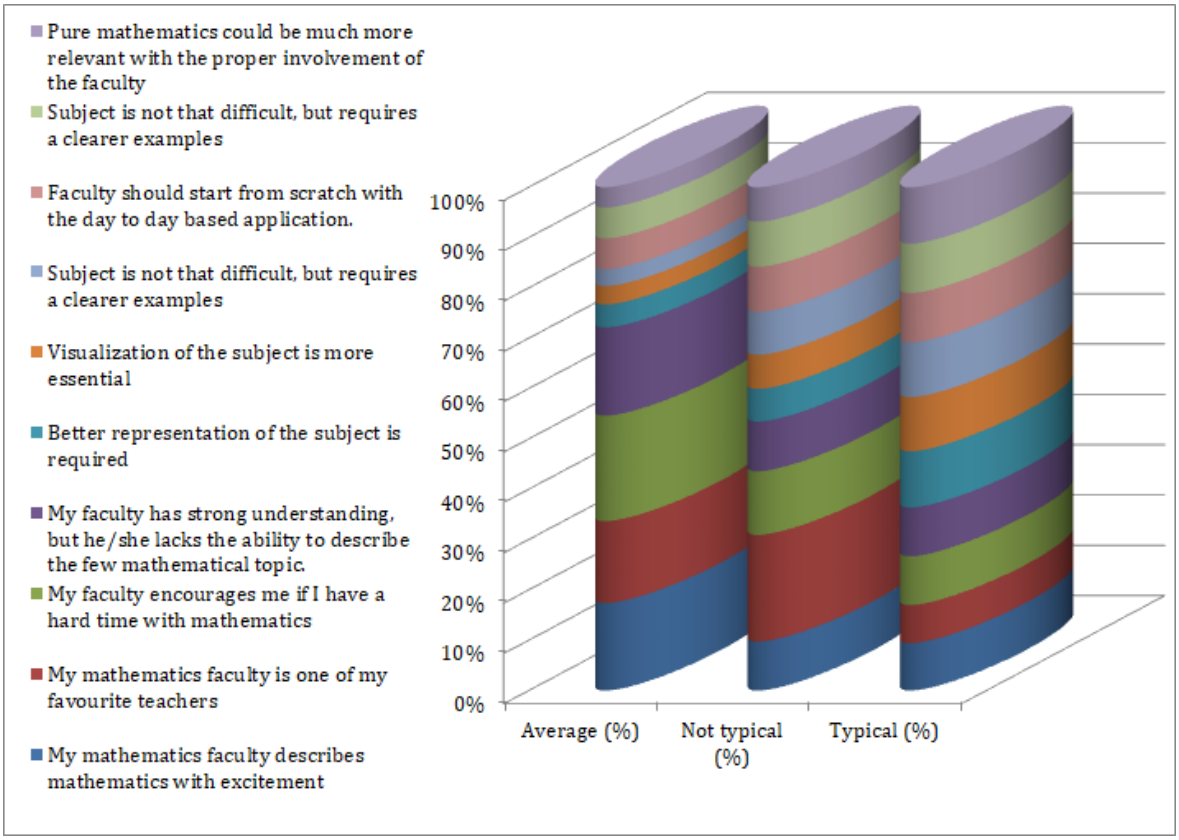

FIGURE 7. Graphical representation of Questionnaire based response

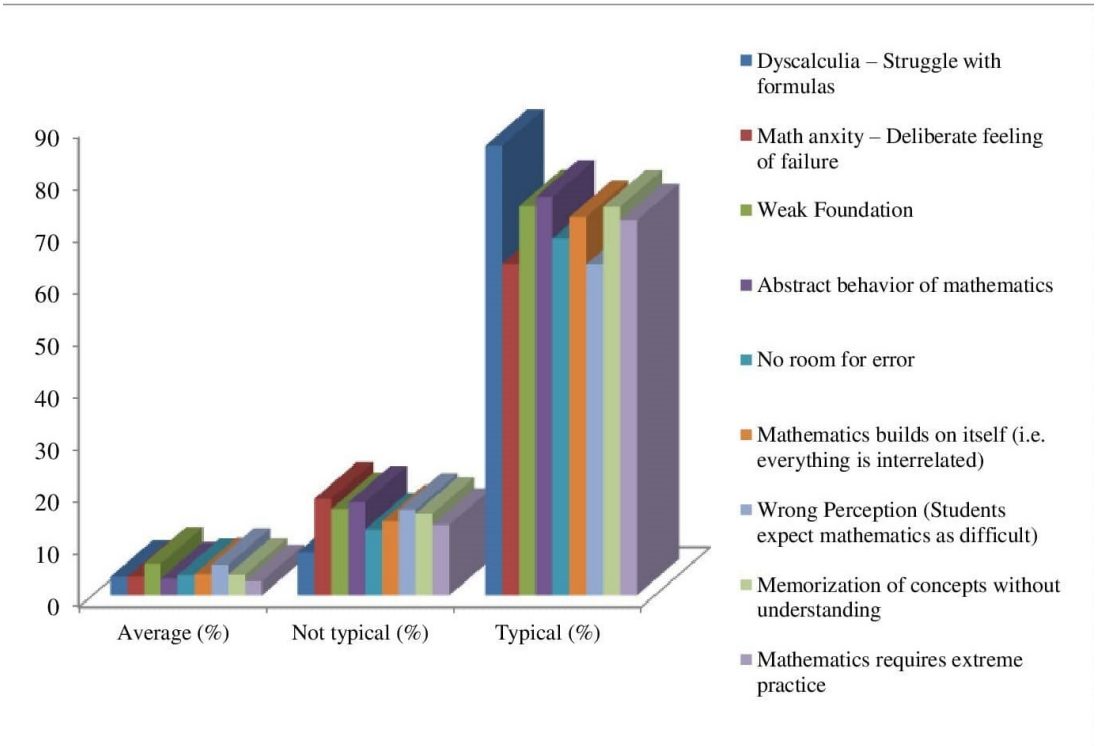

FIGURE 8. Graphical representation of to understand the struggle of students at college level

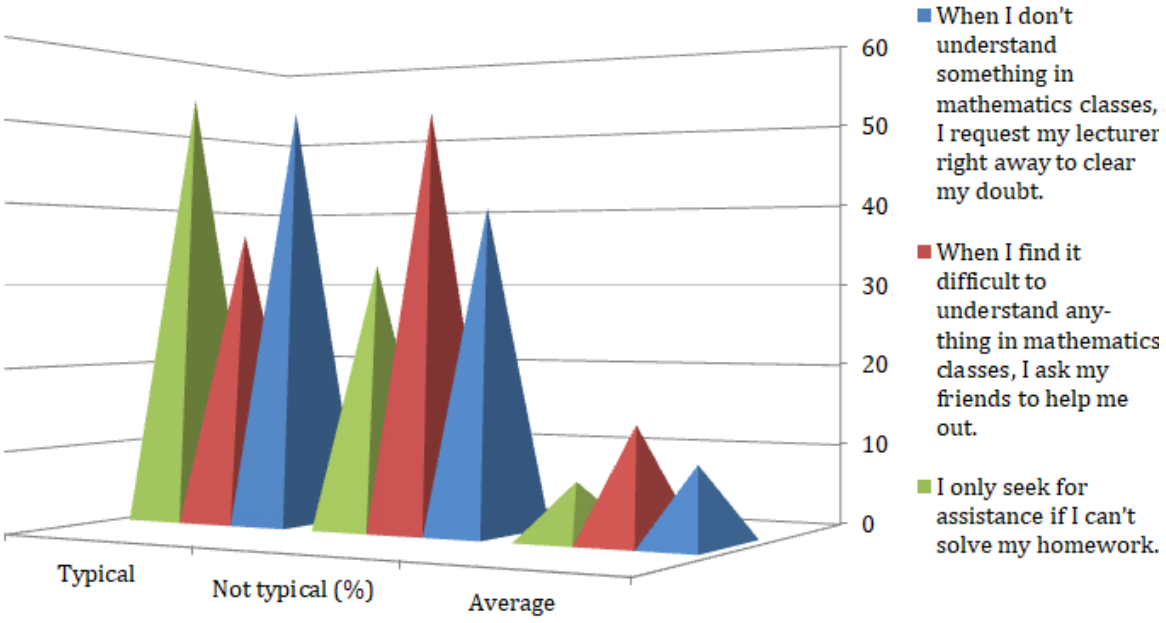

FIGURE 9. Graphical representation to understand the students' quest for help

2. DISCUSSION

The conclusions of the research will be discussed throughout this section.

2.1. One's beliefs on the higher mathematicsat college level is truly based on the faculty's way of teaching and significantly affect his/her mathematical approach. About one-third of respondents hypothesize that mathematics is complicated to understand because faculties aren't good at expression and are they don't focus on application part. According to the students even the pure mathematics can easily be understood with the proper explanation of topic. According to the students, visualization of topic is more important which is possible only if the definition would be properly explained. Teachers should promote problems that are mathematically formulated and do not contribute to real-life problems because there are negligible problems which aren't mathematically formulated, this would improve students' imagination. The first hypothesis is therefore appropriate.

2.2. Students' struggle toward mathematics,Students' self-effectiveness towards mathematical problems and Students' visualization towards mathematics application is negligible and Students' behavioral correlation towards mathematics problem solving is high. When students' encounter problems in their real experiences, the solution of which necessitates certain mathematical understanding, they do not understand the mathematical context, or they cannot apply what they have learned from mathematics, which proves that students struggles a lot with the application part of mathematics and their self-effectiveness isn't very high. Few students were scared of mathematics. There is indeed a significant association between students' trust in the use of mathematics and their approach to the study of mathematics. Students were facing Dyscalculia and math anxiety at higher level. Basically, Mathematical anxiety is a circumstance that certain people encounter when they face a mathematical challenge. Good mathematical feeling gives good mathematical perception, and vice versa. Unpleasant feeling like distress, cluelessness and hopelessness in mathematical work appears to influence mathematical performance. The preliminary studies related to mathematical anxiety, which Richardson and Suinn (1972) published specifically to measure mathematical anxiety assessment called MARS (Mathematical anxiety rating scale). Students' perception towards mathematics is very

complex because of lack of understanding of application part of higher mathematics (Table 4, Table 6, Table 8, Fig 3). For students mathematics seems to have very less relation to daily life. Reassurances are relevant for several of the participants: almost 48% of the participants assume that they would be a good mathematician; yet another feel that they also have an ability for mathematics. In order to improve students' conviction in their mathematics achievement, the educator must account for the fact that distinct learners are at a distinct phases. Assistance is also significant in the study of mathematics. If a student is struggling with a difficulty, it generally has two ways to solve one is to get similar solved problem and other to seek the help of a teacher or a classmate. Almost majority of the students question the instructor immediately when they don't comprehend something during the class; one third seek assistance from classmate after the lesson. The number of students asking for help is significant.There really is a formidable correlation between students' consciousness and their perception towards mathematics, and also between the pupils' assistance actions and their attitude towards learning mathematics (Table 4,Fig 8). The second, third and eighth hypothesis are therefore appropriate.

2.3. Individual appraisal is associated with the performance in mathematics and consciousness is insignificantly associated with the performance in mathematics. It can easily be observed that the understanding of students is strong, and more than 43% of students are convinced that there is indeed a strong association between their effort to understand mathematics and their performance (Table 5, Fig 10). The sense of individual appraisal of students is closely associated with their approach towards mathematics. The third hypothesis is the assertion of evidence. The amount of self-satisfaction of students is very substantial (Table 6, Fig 10), however it is not relevant to their understanding of mathematical concepts. And then we could conclude that the hypothesis tested is irrelevant. Also, nervousness in mathematics is in weak relationship with the approach towards mathematics since students who have high levels of discomfort: more than half of them concern about their mathematics scores, and several of the students felt uncomfortable about the mathematics class. So, anxiety doesn't really influence the attitude of students to mathematics (Table 8, Fig 1, Fig 7, Fig 8).

3. Conclusions, Limitation and Future Implications

Most students are under the impression their teacher enjoys math and he/she is a good mathematician. But somewhere their way of teaching isn't satisfactory. Students acknowledged the Teacher's efficiency but doubt their application party because most of the mathematics faculties fail when it comes to explain the pure mathematics. Also, approximately 55% of the participants acknowledged their teacher's willingness to explain mathematics. Teachers significantly influence students' framework towards mathematics. Teachers significantly affect students' framework to mathematics. The results of this study demonstrate that perhaps the teacher is by far the most significant element in mathematics learning. Students have an influence mostly on relevance of mathematics or real life in their behavior to the fact into consideration. Self-effectiveness and self-evaluation are two other variables that can affect the behavior of students. The findings of the analysis understand how great it is to reconsider the problems which seems not to have relation with mathematics because even day-to-day problems can easily be modeled mathematically.

Conflict of Interests

The author(s) declare that there is no conflict of interests.

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